GUIDELINES

for the

PROVISION OF EQUIPMENT

to

HANDLE EMERGENCY CONDITIONS (POWER OUTAGES)

in

NEW SEWAGE WORKS

in the

PROVINCE OF ONTARIO

Ministry of the
Environment

GUIDELINES

FOR THE PROVISION OF EQUIPMENT

TO

HANDLE EMERGENCY CONDITIONS (POWER OUTAGES)

IN NEW SEWAGE WORKS

IN THE PROVINCE OF ONTARIO

These guidelines were prepared to provide a standard basis for the designers of new sewage handling facilities to approach the problems associated with handling the sewage during power outages and other irregularities.

All new works should be designed along these guidelines to ensure that bypassing situations are reduced to an absolute minimum. Solution of this type of problem in existing systems may require long-term staged correction problems because of the costs involved.

If these guidelines were introduced as requirements for all works, major problems might be encountered with existing trunk sewers, pumping stations and treatment plants where there are frequent overflows due to the collection of combined sewage, where these works are very old, or where they are on too small a scale. Although the guidelines are intended to aid the designer, they should be used as a guide by operating authorities when dealing with their existing works.

There are many other areas in the handling of sewage which are outside the realm of these guidelines but which require more intense surveillance if sewage bypassing is to be minimized. An informal bulletin is being prepared which will outline matters that are presently considered as good practice in designing, constructing and operating sewage works in the Province of Ontario.

CONTENTS

I A. PREAMBLE AND DEFINITIONS

The problem of preventing by-passing of sanitary sewage or at least minimizing the effect of such a discharge on the receiving watercourse has no universal solution. The provision of standby power units at pumping stations will not eliminate by-passing in the tributary sewer system where sewage levels are not directly regulated by the operation of the pumping station. Discharge at such points is caused when the sewer is inadequate to handle the flows. Such by-passing of sanitary sewage should be eliminated. The basic premise used in the preparation of the guidelines is the requirement that:

> All sanitary sewage must receive at least primary treatment and chlorination or the equivalent before it is discharged to any watercourse.

From this it is apparent that

1) the operator of the facility must be made aware of all situations where by-passing of sanitary sewage is imminent, so that all possible effort may be made to prevent any by-passing;

2) pumping stations should be provided with the capability of conveying the sewage to sewers which ultimately drain to the sewage treatment plant or have the storage capacity or facilities to provide treatment to prevent by-passing at the pumping station or flooding of basements, etc., in the event of an interruption of electrical power;

3) during power outages, all sewage treatment works should be equipped to provide at least primary treatment and chlorination or the equivalent for all flows reaching the plant.

The following definitions are provided to ensure that the guidelines are clear.

1. ELECTRICAL POWER OUTAGE - Any interruption or fluctuation of the supply of electrical power to the treatment plant or pumping station which causes the shut-down of electrical pumps and equipment.

2. AUXILIARY POWER SUPPLY - Any power supply which must be manually activated to supply power when this is required.

3. STANDBY POWER SUPPLY - This equipment would consist of a power source which is activated automatically when the electrical power is cut off or interrupted long enough to bring about the shut-down of electrical equipment. Provision should be made for the protection of the standby unit upon the resumption of the electrical service as well as for the control facilities needed to permit progressive start-up.

I B. PUMPING STATIONS

B.1 EQUIPMENT REQUIREMENTS

(a) Alarm Systems

ALL PUMPING STATIONS SHOULD BE EQUIPPED WITH AN ALARM SYSTEM WHICH WILL RELAY A SIGNAL TO A CONTINUOUSLY MANNED CENTRE WHEN THE LIQUID LEVEL IN THE WET WELL APPROACHES THE BY-PASSING POINT.
This will ensure that no discharge is made without the knowledge of the operating authority. The signal will be relayed via normal telephone circuits and activate an alarm at the manned centre. This alarm should consist of an audio signalling device which can be manually silenced as well as a light which will remain illuminated until the wet well level is lowered below the activation depth. The triggering mechanism should be placed to provide time between the activation of the alarm and the actual by-pass for the operator to take action. This alarm system would also be activated in the event of the automatic start-up of the standby power equipment.

(b) Standby Power

ALL PUMPING STATIONS SHOULD BE PROVIDED WITH STANDBY-POWERED EQUIPMENT OR THE EQUIVALENT TO MINIMIZE BY-PASSING DURING POWER OUTAGES.
In determining the necessity for standby power, it will be necessary to take into consideration the frequency of power outages, the reliability of the alarm system, the availability of operating personnel for emergencies, the suitability of the receiving water body to assimilate

any discharge of sanitary sewage, available retention time in the system, and specific design requirements. The design engineer should submit, in writing, documentation of his findings in these areas to substantiate either the provision of standby power or an alternate solution. In addition, all applications to the Branch for approval of pumping stations should include the information outlined in Section II

B.2 OPERATIONAL REQUIREMENTS

(a) Alarm Systems

(i) THE HIGH LEVEL ALARM SYSTEMS SHOULD BE TESTED AT LEAST EVERY TWO WEEKS BY PERMITTING THE LIQUID LEVEL IN THE PUMP WELL TO ACTIVATE THE ALARM.

(ii) IN INSTANCES WHERE BY-PASSING OF SEWAGE WILL TAKE PLACE THE DISTRICT ENGINEER SHOULD BE NOTIFIED IMMEDIATELY.

(iii) A RECORD SHOULD BE MADE OF EACH TIME THAT THE HIGH LEVEL ALARM IS ACTIVATED. THE DISTRICT ENGINEER OF THE SANITARY ENGINEERING BRANCH, DEPARTMENT OF THE ENVIRONMENT SHOULD BE PROVIDED WITH COPIES OF THESE RECORDS EACH YEAR.
The information set out in the Appendix should be included in these records.

(b) Standby Power

STANDBY POWER UNITS IN THE PUMPING STATIONS SHOULD BE INSPECTED AND MAINTAINED ROUTINELY AND SHOULD BE STARTED AND OPERATED UNDER FULL LOAD CONDITIONS AS OFTEN AS IS NECESSARY TO ENSURE THAT THE UNITS WILL BE FUNCTIONAL DURING ANY EMERGENCY. ALL UNITS SHOULD BE OPERATED A MINIMUM OF ONE HOUR EVERY TWO WEEKS.

I C. SEWAGE TREATMENT PLANT

C.1 EQUIPMENT REQUIREMENTS

ALL SEWAGE TREATMENT PLANTS SHOULD BE EQUIPPED TO PROVIDE AT LEAST PRIMARY TREATMENT AND CHLORINATION OR THE EQUIVALENT FOR ALL COLLECTED SEWAGE.
In certain instances, circumstances may dictate that a higher level of treatment is required. Such advice would be given by the District Engineer.

Each specific installation should provide for the following considerations:

(i) means for illuminating working areas to ensure safe working conditions;

(ii) standby power source or equivalent to power pumps, motorized valves and control panels that are necessary to maintain the sewage flow through the treatment plant.

C.2 OPERATIONAL REQUIREMENTS

ALL STANDBY POWER EQUIPMENT, EMERGENCY LIGHTING AND SIGNALING SHOULD BE ADEQUATELY MAINTAINED AND OPERATED CONTINUOUSLY UNDER FULL LOAD CONDITIONS FOR AT LEAST AN HOUR EACH WEEK

SECTION II

INFORMATION REQUIRED FOR PUMPING STATIONS APPLICATIONS

In order to assess the need for standby power at pumping stations, it is necessary to know details of the power supply, the receiving watercourse and the pumping station. Complete the following questionnaire and submit it along with the application for approval.

II A. ELECTRICAL POWER SUPPLY

(i) The name of the operating authority of the power system at the point where the pumping station is tied in is _____.

(ii) The number of power feeder lines supplying the grid operated by this authority is _____.

(iii) The number of alternate routes possible within the power grid to supply the point of connection is _____.

(iv) The number of alternate transformers through which power could be directed to power the pumping station in the event of failure of the major feed is _____.

(v) Is the service above ground? _____.

(vi) List the power abnormalities including power surges and drops during the past 5 years for the area of the pumping station.

Date	Duration	Reason for Abnormality

II B. RECEIVING WATERCOURSE

(i) It will be necessary to know in detail the route by which by-passed flow would gain access to any receiving watercourse. A detailed description of the flow path that would be taken and a sketch showing the route should be provided as well as the following information.

(ii) The flow in the receiving watercourse at the point of by-pass from the pumping station is as follows:
- FLOW IN DRY WEATHER_____CFS
- FLOW IN WET WEATHER_____CFS

(iii) The nearest water intake is located on the receiving watercourse within_____feet of the point of entry of the by-passed flow.

(iv) A summary of the domestic water works on the receiver within the sphere of influence of the by-pass point would include

Name of Water Works	Approximate distance from point of by-pass

II C. PUMPING STATION

(i) The operating authority responsible for maintenance and operation of this pumping station is _____.

(ii) The high level alarm is set up to relay a signal to _____.

(iii) Between the time of activation of the high level alarm and the by-passing of sanitary sewage there are

_____gallons of storage capacity availab
in the sewers
_____gallons of storage capacity availab
in the pumping station

(iv) This storage will provide

_____ minutes retention before by-pass at the average daily design flow of _____ gpm

_____ minutes retention before by-pass at the peak design flow of _____ gpm

(v) The pumping station control _____ ("is" or "is not") equipped to automatically re-start pumps in the event of their shutting down during power fluctuations and outages.

(vi) It is possible to pump around the pumping station with portable equipment by utilizing the following procedure

_____

_____

_____

APPENDIX

INFORMATION TO BE INCLUDED IN HIGH LEVEL ALARM REPORT

- Pumping Station
- Date
- Time alarm activated
- Time operator contacted
- Name of operator
- Name of person contacting operator
- Time of arrival of operator at pumping station
- Reason for high level in wet well
- Any by-pass
- Amount of by-pass
- Duration of by-pass
- Weather conditions
- Who reported the by-passing to the District Engineer
- When was the report made